WATER MANAGEMENT
ACTIVITIES IN THE
EAST POPLAR RIVER BASIN
1980 ANNUAL REPORT

Report No. HYD-2-7

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SYNOPSIS

This report summarizes the activities of the Water Management Service (WMS) in the East Poplar River Basin in 1980. This format replaces a series of bi-monthly reports prepared by the various WMS Divisions which was initiated in 1978.

The Ground Water Division issued permits for test drilling, well installation and pump testing for several dewatering wells near the SPC mine site and worked on a proposal to monitor ground water quality near the ash lagoons. The Surface Water Division moved closer to licensing Cookson Reservoir under The Water Rights Act and the project received a 35 year license under The International River Improvements Act in 1980.

The Hydrology Branch forecast spring runoff flows in the East Poplar River Basin in 1980 and since the runoff was well below normal Cookson Reservoir did not fill and no operations were required during spring runoff.

All of the base flow and demand releases specified in the interim apportionment formula proposed by the 1976 Poplar River Task Force were met in 1980.

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CHAPTER I

INTRODUCTION

The East Poplar River basin is situated in southern Saskatchewan about 150 km south of Moose Jaw. The East Poplar River has its headwaters in Saskatchewan and flows south into the State of Montana where it joins the Middle and West forks of the Poplar River. The drainage area in Canada is 1400 km^2. A plan showing the East Poplar River Basin in Saskatchewan is shown on Figure 1.

In the 1970s Saskatchewan Power Corporation (SPC) began work on a thermal electric generating station, a lignite mine and a cooling water reservoir in the East Poplar River Basin near Coronach, Saskatchewan. One 300 megawatt thermal generating unit was brought on line in 1980 with the second 300 megawatt unit scheduled for completion in 1983.

The Water Management Service of Saskatchewan Environment has been monitoring various aspects of these developments. The dewatering programs for the coal beds and monitoring of ground water levels and quality in the coal bed area, ash lagoon area and near Cookson Reservoir are of prime interest for the Ground Water Division of the Water Rights Branch. The Surface Water Division of the Water Rights Branch licences surface water development projects such as Cookson Reservoir. The Operations Division of the Hydrology Branch

provides a water supply forecasting service for Cookson Reservoir, advises SPC on reservoir operations and ensures that releases are made to meet apportionment commitments to the State of Montana.

The Environmental Protection Service of Saskatchewan Environment monitors water and air quality in the area and participated in the development of air and water quality standards as specified by the Poplar River Bilateral Monitoring Committee of the International Joint Commission (IJC).

CHAPTER II

WATER RIGHTS BRANCH ACTIVITIES

A. GROUND WATER

Dewatering of the coal beds proceeded in 1980 without any complaints of lowered ground water levels from surrounding farmers. SPC proposed, through the Department of Mineral Resources (DMR), that six or seven additional dewatering wells be installed. SPC was advised that Saskatchewan Environment, Water Rights Branch, would consider issuing a Permit to Conduct Ground Water Investigations for the test drilling, well installation and pump testing phase. Three applications were received and permits were issued for the Rockglen area and Fife Lake are on August 14, 1980, and for the Coronach area on December 29, 1980. A meeting was held with DMR to discuss the handling of ground water rights for dewatering wells. Changes in rehabilitation of several dewatering wells were also agreed to, as required by approval from the Minister of Mineral Resources.

Work dealing with the proposed additional monitoring of the ground water system near the ash lagoon involved reviewing the consultant's (Clifton and Associates) report and providing comments to the Water Pollution Control Branch, Saskatchewan

Environment, meeting with the consultant to discuss the monitoring wells near the ash lagoons and reviewing the ground water component of the draft approval operation of the ash lagoon system at the request of the U.S. Environmental Protection Service (EPS). Approval was given for the construction of a standby well for construction purposes.

The proposed system of monitoring and exchange of data between Canada and the U.S. was reviewed and comments were provided as a function of the Poplar River Bilateral Monitoring Committee.

B. SURFACE WATER

The major project in the East Poplar River basin from a surface water point of view is Cookson Reservoir. The licencing process for this project began in 1972. In 1980 a request was sent to SPC for information on land control for temporary surcharging, topographical information and copies of agreements with the Rural Municipality involved, Saskatchewan Highways and the CPR. SPC provided all required information with the exception of agreements with CPR and Saskatchewan Highways, which are awaiting clearance through CPR's legal department.

Cookson Reservoir is also licensed by Environment Canada under the International River Improvements Act. The original

licence, for 5 years, was issued on April 19, 1975 and required that an application for renewal be submitted 6 months prior to its expiry date. SPC complied with this provision by applying in September 1979. A Licence Review Committee was set up to deal with this application and on April 19, 1980 a new licence with a 35 year term was issued to SPC.

Several small projects received the attention of the Surface Water Division including the licensing of one domestic project, the cancellation of three, and the transfer of three others to new owners, Some of this activity was a follow up to the 1976 basin study.

CHAPTER III

HYDROLOGY BRANCH ACTIVITIES

A. GENERAL

Cookson Reservoir is owned and operated by SPC. The Hydrology Branch provides a forecasting and operation planning service to SPC and advises SPC on reservoir operations. The Hydrology Branch also administers the interim apportionment arrangement with the U.S. to ensure that base flows and demand releases are achieved.

B. WATER SUPPLY FORECASTING

Water supply forecasts are prepared each year prior to the spring runoff to aid in the operation planning for Cookson Reservoir. These forecasts are based on three precipitation periods recorded at Coronach: the previous August to October (Antecedent), November to February (Winter) and March. The recorded precipitation in the basin from August 1979 to December 1980 is shown in Table 1.

Snow surveys are conducted each year and the results of the 1980 measurements are shown in Table 2. The locations of the snow courses are shown on Figure 1.

Table 1

PRECIPITATION IN THE EAST POPLAR RIVER BASIN
1979 - 1980

	Coronach	West Poplar*	
	Recorded (mm)	Recorded (mm)	Normal (mm)
August 1979	4.0	6.4	32.5
September 1979	32.4	24.2	27.7
October 1979	25.6	17.3	13.7
November 1979	13.5	9.5	11.0
December 1979	14.0	7.5	12.0
January 1980	21.0	21.5	18.3
February 1980	16.0	12.0	11.9
March 1980	17.0	14.0	9.7
April 1980	9.0	4.0	23.1
May 1980	24.0	31.1	49.0
June 1980	65.0	82.9	65.5
July 1980	51.2	17.9	46.5
August 1980	80.0	29.1	32.5
September 1980	33.0	38.0	27.7
October 1980	19.0	18.4	13.7
November 1980	17.0	13.7	11.0
December 1980	11.0	35.5	12.0
1980 Totals	363.2	318.1	320.9

*For comparison purposes.

Table 2

1980 SNOW SURVEY RESULTS
EAST POPLAR RIVER BASIN

	March 1		March 15	
	Snow Depth (cm)	Water Equiv. (mm)	Snow Depth (cm)	Water Equiv. (mm)
Coronach N.	-	-	2.6	12.9
Coronach S.	0	1.0	0	6.4
Fife Lake	0	0	0	0
Willow Bunch	0	0	0	0

The snow survey results were considered, along with the results of regression equations based on precipitation, in preparing water supply forecasts for 1980.

C. 1980 STREAMFLOW AND WATER SUPPLY

Cookson Reservoir was at elevation 752.55 m on January 1, 1980 and had receded to 752.54 m by March 5. Inflow to the reservoir from the East Poplar River was characterized by two peaks, one of 0.9 m^3/sec on March 20, and one of 1.35 m^3/sec on March 29. The inflow hydrograph from Girard Creek was similar to the East Poplar with the first peak 0.71 m^3/s on March 20 and the second peak 0.94 m^3/s on March 30. The reservoir elevation rose as a result of inflow and by April 9 had reached itx maximum elevation for the year of 752.78 m, 0.22 m below the full supply level of 753.0 m. Following the runoff, Cookson Reservoir receded to an elevation of 752.03 m by December 31, 1980.

No major releases were made from Cookson Reservoir during the runoff period and hence the maximum annual peak mean daily flow in the East Polar River at the International boundary was 0.68 m^3/s on May 16.

Figure 2 shows the East Poplar River, Girard Creek and Cookson Reservoir hydrographs for 1980.

The annual runoff volumes for the East Poplar River above Cookson Reservoir, Girard Creek near Coronach and East Poplar River at International boundary hydrometric stations are shown in Table 3.

Table 3

1980 SUMMARY OF STREAMFLOW VOLUMES

Station	Annual Volume (dam^3)
East Poplar River above Cookson Reservoir	716
Girard Creek near Coronach	2 250
East Poplar River at International Boundary	3 930

The change in storage on Cookson Reservoir from January 1 to December 31, 1980, was 3 680 dam^3, a net loss for the year.

D. 1980 COOKSON RESERVOIR OPERATIONS

All structure operations during 1980 at Cookson Reservoir were made to meet Saskatchewan's commitment to the interim apportionment formula (for details see Chapter IV). The operations were made to maintain a minimum flow in the East Poplar River at the International Boundary of 0.057 m^3/s from January 1 to August 31 and 0.028 m^3/s from September 1 to December 31. During the period April 15 to May 29, 180 operations were also made to fulfill a demand release by Montana of 1 230 dam^3. This release was made to meet the volume committed as a result of the 1979 spring runoff on the Middle Fork Poplar River being in excess of 14 800 dam^3. All structure operations are summarized in Table 4.

Table 4

1980 COOKSON RESERVOIR OPERATIONS

Period of Operation	Operation	Purpose
January 1 to April 1	25 cm by pass valve partially open	To maintain a flow of 0.057 m^3/s at the International Boundary.
April 1 to April 15	25 cm by pass valve closed	Flow of 0.057 m^3/s was being met by local inflow.
April 15 to April 16	25 cm by pass valve 3/4 open	To pass 0.31 m^3/s at the boundary requested by Montana.
April 16	25 cm by pass valve 1/2 open	An adjustment was necessary to avoid exceeding the flow requested by Montana.
April 17 to May 12	25 cm by pass valve 1/8 open	An adjustment was necessary to avoid exceeding the flow requested by Montana.
May 12 to May 22	25 cm by pass valve opened further	To pass the increased flows requested by Montana (0.52 m^3/s).
May 22 to May 29	25 cm by pass valve partially closed	To pass the reduced flows requested by Montana (0.23 m^3/s).
May 29 to December 31	all structures in Morrison Dam closed	Leakage and ground water discharge made up the flow required at the boundary.

CHAPTER IV

APPORTIONMENT

The Poplar River Task Force[1]/ in its 1976 Joint Studies Report for Flow Apportionment for the Poplar River Basin in Saskatchewan and Montana proposed the apportionment formula described in Appendix I. It called for, among other things, equal sharing of the waters of the Poplar River basin, subject to certain allowable variations on specified streams, and to specific delivery schedules.

The Task Force also recommended that the IJC appoint a Poplar River Board of Control, with members selected from the public service of the Governments of Canada, the United States, Montana and Saskatchewan to administer the apportionment under the IJC's direction.

The Poplar River Board of Control has not been formed, however the interim apportionment proposals have been adopted pending final resolution of the apportionment question.

1/ The Poplar River Task Force was formed by the Souris-Red Rivers Engineering Board following a request by the International Joint Commission for a proposal for flow apportionment in the Poplar River basin.

Releases were made from Cookson Reservoir in April and May of 1980 to fulfill apportoinment commitments for a demand release of 1 230 dam^3 from 1979. United States Geological Service (USGS) data indicates that this commitment was met.

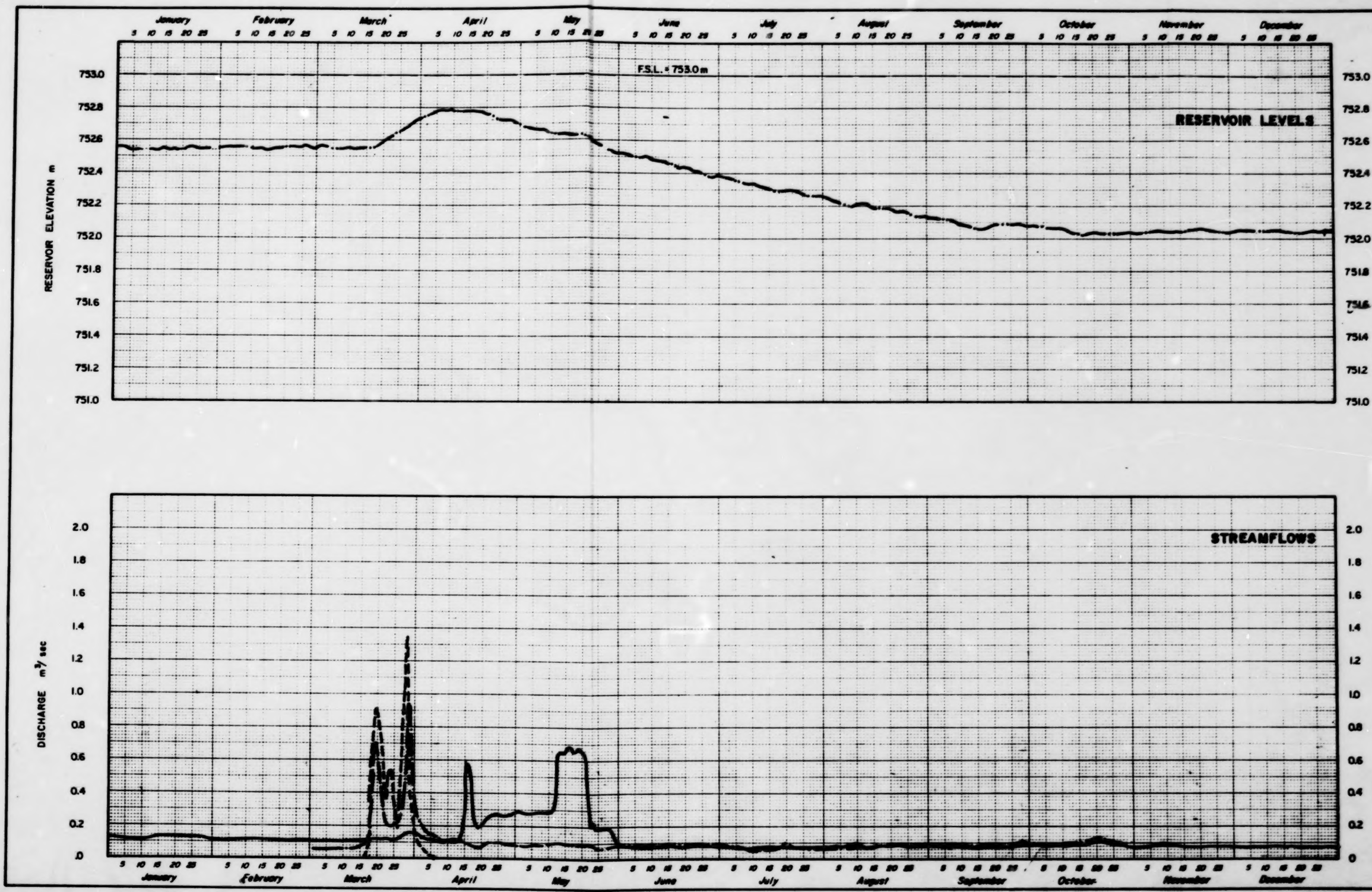
The 1980 to 1981 international commitment was calculated on the basis of March to May 1981 flow on the Middle Fork of the Poplar River. Data provided by USGS through Water Survey of Canada (WSC) indicated that the natural flow was 1 620 dam^3. The interim apportionment formula states that the commitment to Montana on the East Poplar River when this volume of flow occurs in the Middle Fork is:

1. June 1, 1980 to August 31, 1980 - 0.028 m^3/sec;
2. September 1, 1980 to May 31, 1981 - 0.028 m^3/sec; and
3. Demand release of 370 dam^3 at any time from June 1, 1980 to May 31, 1981.

Since flows from June 1 to December 31, 1980, were about 0.08 m^3/sec the first two points in the apportoinment formular were met. The demand release was not requested by Montana in 1980, however, it can be requested at any time during the remainder of the balance period (i.e. January to May, 1981).

FIGURES

Saskatchewan Environment	WATER MANAGEMENT ACTIVITIES IN THE EAST POPLAR RIVER BASIN- 1980 ANNUAL REPORT
Hydrology Branch	**EAST POPLAR RIVER BASIN KEY MAP**
Drn / Date	Figure 1
Ck'd / Plan No. H2-5(27A)	


RESERVOIR LEVELS
F.S.L. = 753.0 m
RESERVOIR ELEVATION m
753.0
752.8
752.6
752.4
752.2
752.0
751.8
751.6
751.4
751.2
751.0
January
February
March
April
May
June
July
August
September
October
November
December
STREAMFLOWS
DISCHARGE m³/sec
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0

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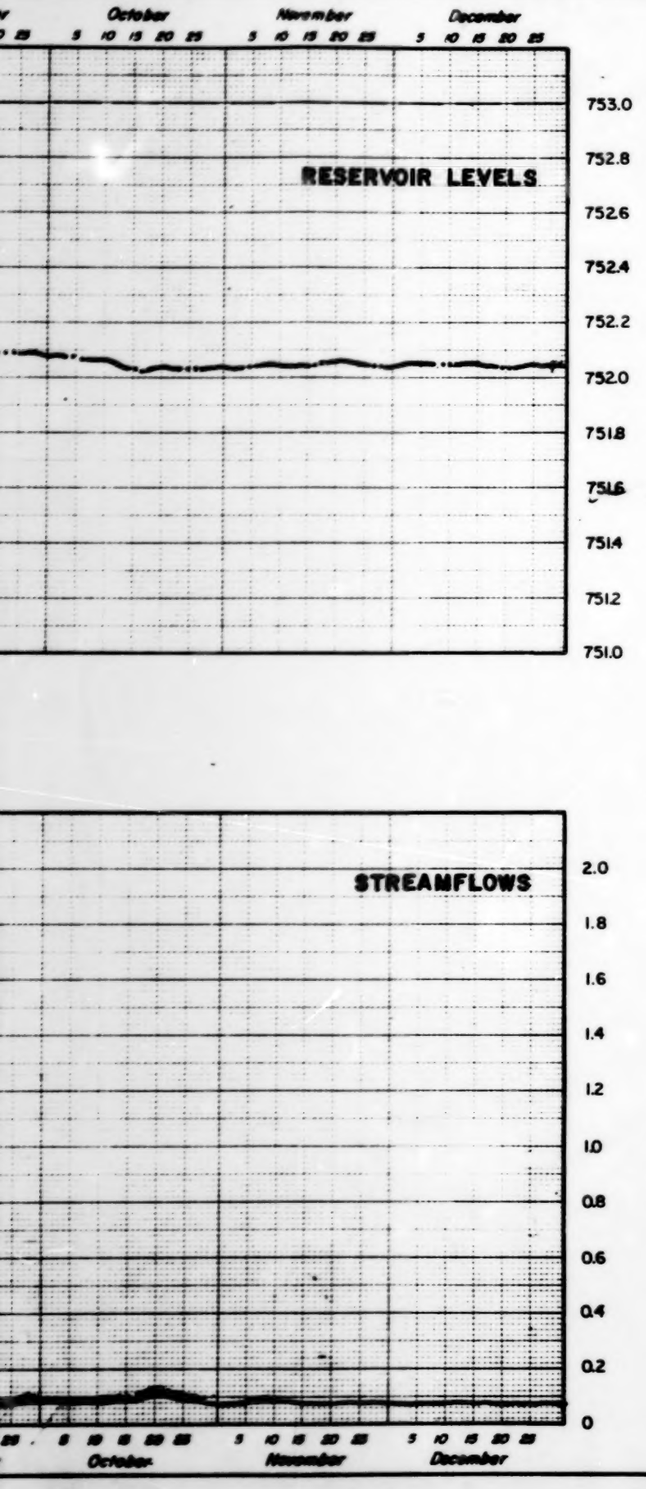

LEGEND

- COOKSON RESERVOIR ELEVATION
- EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY
- EAST POPLAR RIVER ABOVE COOKSON RESERVOIR
- GIRARD CREEK NEAR CORONACH

Saskatchewan Environment
Hydrology Branch

WATER MANAGEMENT ACTIVITIES IN THE EAST POPLAR RIVER BASIN-1980 ANNUAL REPORT

1980 EAST POPLAR RIVER GIRARD CREEK AND COOKSON RESERVOIR HYDROGRAPHS

Drn. J.B.	Date MARCH/81	Figure 2
Ck'd:	Plan No. H2-5(27)	

APPENDIX A

INTERIM APPORTIONMENT IN THE

POPLAR RIVER BASIN

APPENDIX A

INTERIM APPORTIONMENT IN THE POPLAR RIVER BASIN

The following apportionment formula was recommended by the 1976 Poplar River Task Force[1/] and has been tentatively adopted pending formal adoption of an apportionment formula:

The aggregate natural flow of all streams and tributaries in the Poplar River Basin crossing the International Boundary shall be divided equally between Canada and the United States subject to the following conditions:

1. The total natural flow of the West Fork Poplar River and all its tributaries crossing the International Boundary shall be divided equally between Canada and the United States but the flow at the International Boundary in each tributary shall not be depleted by more than 60 per cent of its natural flow.

2. The total natural flow of all remaining streams and tributaries in the Poplar River basin crossing the International Boundary shall be divided equally between Canada and the United States. Specific conditions of this division are as follows:

1/ The Poplar River Task Force was formed by the Souris-Red Rivers Engineering Board following a request by the International Joint Commission for a proposal for flow apportionment in the Poplar River basin.

a) Canada shall deliver to the United States a minimum of 60 per cent of the natural flow of the Middle Fork Poplar River at the International Boundary, as determined below the confluence of Goose Creek and Middle Fork.

b) the delivery of water from Canada to the United States on the East Poplar River shall be determined on or about the first day of June of each year as follows:

i) When the total natural flow of the Middle Fork Poplar River, as determined below the confluence of Goose Creek, during the immediately preceding March 1st to May 31st period does not exceed 4 690 cubic decametres (3,800 acre-feet), then a continuous minimum flow of 0.028 cubic metres per second (1.0 cubic feet per second) shall be delivered to the United States on the East Poplar River at the International Boundary throughout the succeeding 12 month period commencing June 1st. In addition a volume of 370 cubic decametres (300 acre-feet) shall be delivered to the United States upon demand at any time during the 12 month period commencing June 1st.

ii) When the total natural flow of the Middle Fork Poplar River, as determined below the confluence of

Goose Creek, during the immediately preceding March 1st to May 31st period is greater than 4 690 cubic decametres (3,800 acre-feet), but does not exceed 9 250 cubic decametres (7,500 acre-feet) then a continuous minimum flow of 0.057 cubic metres per second (2.0 cubic feet per second) shall be delivered to the United States on the East Poplar River at the International Boundary during the succeeding period June 1st through August 31st. A minimum delivery of 0.028 cubic metres per second (1.0 cubic feet per second) shall then be maintained from September 1st through to May 31st of the following year. In addition, a volume of 617 cubic decametres (500 acre-feet) shall be delivered to the United States upon demand at any time during the 12 month period commencing June 1st.

iii) When the total natural flow of the Middle Fork Poplar River, as determined below the confluence of Goose Creek, during the immediately preceding March 1st to May 31st period is greater than 9 250 cubic decametres (7,500 acre-feet), but does not exceed 14 800 cubic decametres (12,000 acre-feet), then a continuous minimum flow of 0.085 cubic metres per second (3.0 cubic feet per second) shall be delivered to the United States on the East Poplar

River at the International Boundary during the succeeding period June 1st through August 31st. A minimum delivery of 0.057 cubic metres per second (2.0 cubic feet per second) shall then be maintained from September 1st through to May 31st of the following year. In addition, a volume of 617 cubic decametres (500 acre-feet) shall be delivered to the United States upon demand at any time during the 12 month period commencing June 1st.

iv) When the total natural flow of the Middle Fork Poplar River, as determined below the confluence of Goose Creek, during the immediately preceding March 1st to May 31st period exceeds 14 800 cubic decametres (12,000 acre-feet) then a continuous minimum flow of 0.085 cubic metres per second (3.0 cubic feet per second) shall be delivered to the United States on the East Poplar River at the International boundary during the succeeding period June 1st through August 31st. A minimum delivery of 0.057 cubic metres per second (2.0 cubic feet per second) shall then be maintained from September 1st through to May 31st of the following year. In addition, a volume of 1 230 cubic decametres (1,000 acre-feet) shall be delivered to the United States upon demand at any time during the 12 month period commencing June 1st.

c) The natural flow at the International Boundary in each of the remaining individual tributaries shall not be depleted by more than 60 per cent of its natural flow.

3. The natural flow and division periods for apportionment purposes shall be determined, unless otherwise specified, for periods of time commensurate with the uses and requirements of both countries.